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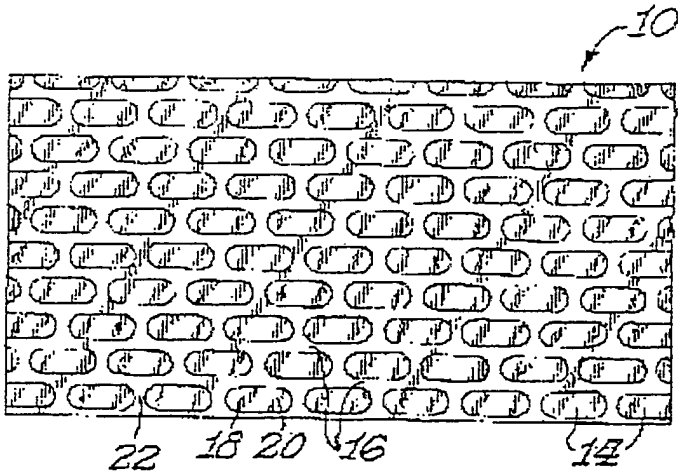
(12) **Patent Application:** (11) **CA 2320471**

(54) LIQUID RETAINING CARPET UNDERLAYMENT

(54) SOUS-COUCHE DE TAPIS RETENANT LES LIQUIDES

Representative Drawing:



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ABSTRACT:

A carpet underlayment or carpet cushion has a compressible flexible polyurethane foam base layer having formed in its upper surface a plurality of projections separated by liquid receiving channels. The channels have a depth between 1/16 and 1/4 inch (and not more than ~ inch), and the projections preferably are formed with top surfaces having regular geometric shapes and aligned in substantially parallel staggered rows. A liquid impervious casted or blown adhesive film, such as a polyethylene film, is adhered to the upper surface of the base layer without substantially deforming the projections and liquid retaining channels. When the carpet underlayment is installed under a carpet, the projections maintain separation

between the carpet and the liquid retaining channels. If a liquid is spilled on the carpet, the underlayment channels retain the spilled liquid in a defined region close to the impact zone.

CLAIMS: Show all claims

*** Note: Data on abstracts and claims is shown in the official language in which it was submitted.

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Liquid Retaining Carpet Underlayment

This invention relates to a carpet underlayment or carpet cushion structure designed to retain spilled liquids closely adjacent the impact area within channels of certain depth, thereby to enable quicker and more complete removal of such spilled liquid.

Background of the Invention

Carpet underlayment or carpet cushion is installed as a barrier layer between a floor surface and carpeting. The underlayment serves as a temperature and sound insulator. It also serves to impart a plushness or cushioning feel to the carpet and enhance the resiliency.

Most carpet underlayment is formed from polyether or polyester polyurethane foams or from rebonded polyurethane foam structure. Rebonded polyurethane foam structures are formed by combining chopped or shredded scraps of polyurethane foam with an adhesive binder and optional fillers, compressing the mixture and curing the binder under pressure and applied heat. With heavy foot traffic, the foam material degrades and deteriorates. The foam or rebond foam also tends to absorb and retain spilled liquids, which soak through the overlying carpet.

The carpet underlayment is often coated with a repellent finish or slip coating to (a) reduce friction for ease of installation and (b) prevent liquids from soaking into the foam. U.S. Patents 5,601,910 and 5,763,040 (Murphy, et al.) discloses a liquid repellant finish that may be applied to a nonwoven carpet cushion. Because carpet underlayment is placed under the carpet

and is not generally visible to those walking upon the carpet, the top surface of the carpet underlayment generally is not patterned.

U.S. Patent 5,762,735 (Collins, et al.) shows a method for manufacturing a laminated carpet pad wherein uncured polyurethane foam is fed between two liner sheets that are compressed between conveyor belts. The foam is allowed to cure while held within the liner sheets between the conveyor belts, and the liner sheets adhere to the cured foam. Because the conveyor belts are formed from woven chain link belts, the top and bottom surfaces of the carpet pad are imprinted with a "chain imprint". However, the chain imprint does not define discrete liquid retaining channels between discrete projections, and the '735 patent does not refer to liquid spill retaining as a feature offered by the carpet pad. The method used for forming the carpet pad in the '735 patent cannot produce channels with the required depth for retaining and containing liquids close to the point of impact.

U.S. Patent 5,045,389 (Campagna) shows a carpet padding formed from a combination of a rebonded polyurethane foam layer, a prime polyurethane foam layer and a top layer of polymer film. The layers are laminated together with a flame or with liquid adhesive. The top layer of polymer film may be embossed with a uniform repeating pattern, such as a diamond or other geometric shape. The embossed pattern does not define discrete liquid retaining channels between discrete projections, and the '389 patent does not refer to liquid spill containment as a feature offered by the carpet padding. Embossing as described by Campagna cannot produce channels with the required depth for retaining and containing liquids close to the point of impact.

A protective carpet system disclosed in U.S. Patent 5,763,039 (Staubs), has a water-proofing membrane layer 14 forming a flat, planar surface onto which is

mounted a carpet material. A plurality of nipple projections 26 extend from the backing surface 24 of the carpet. The carpet is pressed against the waterproofing membrane layer so that the tips of the projections 26 engage the top surface of the membrane layer. The nipple projections 26 keep the carpet material elevated above the membrane layer, providing an air gap that promotes ventilation. The combination of carpet material and water-proofing membrane will not act to retain liquid in a region close to the region where a liquid spill occurred.

U.S. Patent 4,946,719 (Dempsey) discloses an artificial turf structure that includes an impermeable layer positioned below and separated from a permeable section. Vertical perforations 26 through the permeable section permit liquid passage, such as rain water. The permeable section floats on any liquid that passes through the perforations and between the permeable section and the impermeable layer. Rather than containing the liquid close to the point of impact, the '719 patent expressly teaches that it is important to direct the flowing liquid (water) laterally away from the perforations where the liquid passes through the permeable section.

An early protective carpet lining disclosed in U.S. Patent 918,331 (Koll) provided a perforated material 14 and a layer of corrugated material 12 under the carpet material. The corrugated material defined passageways to freely circulate air and to receive dust and dirt. Because Koll was not focused on containing liquid spills, he suggested using paper or fabric as the corrugated material under the carpet. Moreover, the endless passageways created by the corrugated material would not retain liquids in a region close to the point of spill impact.

Floor mats, as distinguished from carpet underlayment or carpet cushion installed beneath wall to wall carpeting, have been designed to collect liquids. U.S.

Patent 5,114,774 (Maxim, Jr.) discloses an absorbent floor mat system with a drainage space 18 between the base portion and the removable portion 15 of the mat (Fig. 4). The base portion 10 has an array of spacer nibs 17 that raise the removable portion 15 relative to the base portion 10. While the drainage space 18 retains liquid, the entire focus of Maxim, Jr. is on a system where the removable portion 15 may be removed for cleaning. Hence, Maxim, Jr. does not recognize the importance of retaining a spill close to the area of insult or impact. Carpet underlayment, by contrast, remains in place under carpet that is not removed for cleaning. If any spilled liquid is not retained close to the point the spill occurred, spot cleaning of the carpet surface close to the are of impact will leave behind a portion of the spilled liquid. Moreover, the liquid retaining channels need to be at a depth that will permit removal and cleaning without removing the carpet from the carpet underlayment.

Another floor mat is disclosed in U.S. Patent 5,358,768 (Wiley, III). The floor mat has a lower mat structure and a removably attachable upper mat structure. The lower mat structure is molded from rubber or plastic and defines a plurality of individual diamond-shaped cavities 39 that have a depth of about 1/2 inch. The upper mat structure is a carpet material that is attached to the lower mat structure with velcro hook and loop fasteners. To remove liquids retained in the cavities, the upper and lower mat structures are separated and removed from the floor of a vehicle.

None of the prior art references disclose a carpet underlayment or carpet cushion that has a base layer of compressible material with an attached liquid impervious layer, wherein the upper surface of the base layer is formed with a plurality of elongated projections forming a repeating pattern and defining liquid receiving channels therebetween. None of the prior art references disclose the

importance of channel depth and configuration in relation to projection height in order to retain liquid held within the channels in a region closely proximate the impact region where a liquid spill occurred. Deep liquid retaining channels prevent complete removal of the liquid where the carpet layer cannot be removed. Shallow channels do not retain the liquid in a region close to the spill impact zone, allowing the liquid to migrate farther on the carpet underlayment surface and farther from the impact zone where most cleaning effort will be focused.

Summary of the Invention

A carpet underlayment or carpet cushion is installed directly under a carpet layer to provide a cushioning effect that gives the carpet better resiliency, a more plush feel and also extends carpet life. The carpet underlayment has a base layer of compressible material, such as flexible polyether or polyester polyurethane foams, or rebond polyurethane foams. The material must have suitable thickness and density to meet industry standards for carpet underlayment. A preferred embodiment uses a base layer of from 7/16 to 1/2 inch thick polyether polyurethane foam with a density of 3 lbs/ft^3.

The base layer has an upper surface onto which is formed a plurality of projections separated by liquid receiving channels. The projections have generally planar top surfaces and preferably a length of about 1/2 to 1 in. and width of about 1/8 to 5/16 inch. The channels preferably have depths from 1/16 to 1/4 inch into the base layer as measured from the generally planar top surfaces of the projections, and widths from 1/16 to 1/4 inch. One-eighth of an inch deep channels are particularly preferred. Channels greater than 1/2 inch deep have not shown acceptable results because liquid is held so deeply within the liquid receiving channels that it is difficult

to remove. Moreover, greater than 1/2 inch high projections have a tendency to twist under compression and may not support the carpet layer sufficiently to meet industry standards.

In the preferred embodiments of the invention, the projections on one carpet underlayment have identical top surfaces formed in regular geometric shapes, such as ovals, rectangles, diamonds or peanuts. Other shapes or a mixture of shapes may be used. In the preferred embodiments, the projections are formed in substantially parallel rows, with the projections from an adjacent row staggered from those if its neighboring rows. The projections form a regular and repeating pattern.

The upper surface of the base layer is covered as uniformly as possible with a liquid impervious film that is attached with an adhesive or preferably by hot roll lamination. The film may be a casted or blown adhesive film, such as polyethylene films, polyvinyl acetate (PVA) films, polyvinyl chloride (PVC) films, polypropylene films, polyester films, polybutadiene films, polyamide films, polycarbonate films, and copolymers thereof. The film must have sufficient tensile strength and elongation to stretch around and cover the projections and channels formed in the upper surface of the base layer without substantially distorting the projections or channels. Films with an ultimate tensile strength of 2000 psi (measured for 0.002 inch thick film) are acceptable, although preferably the films have ultimate tensile strengths of 2200 psi or 2700 psi or even greater.

The carpet underlayment according to the invention is installed under a carpet layer, with the top surfaces of the film-covered projections contacting the underside of the carpet layer. If a liquid is spilled onto the carpet and that liquid penetrates through the carpet, it will be retained close to the liquid impact zone and within the liquid

receiving channels formed in the upper surface of the carpet underlayment. Unlike prior mats and carpet cushions, the liquid receiving channels in combination with the projections retain the spilled liquid in a region closely adjacent the region in which the liquid first penetrated through the carpet. Empirically, it has been shown that 10 ounces of liquid spilled onto a region of 1 in^2 on the carpet will migrate out only about 3 to 6 inches (with 50 lbs. compressive force applied) over the surface of the carpet underlayment.

Accordingly, because the liquid does not migrate substantially from the original spill region, it may be more completely removed with wet-vacuum or absorbing cloths.

Description of the Figures

FIG. 1 is a top plan view of a first embodiment of the carpet cushion according to the invention;

FIG. 2 is a side elevational view of the first carpet cushion embodiment of FIG. 1;

FIG. 3 is a front elevational view of the first carpet cushion embodiment of FIG. 1;

FIG. 4 is a bottom plan view of the first carpet cushion embodiment of FIG. 1;

FIG. 5 is a top plan view of a second embodiment of the carpet cushion according to the invention;

FIG. 6 is a side elevational view of the second carpet cushion embodiment of FIG. 5;

FIG. 7 is a front elevational view of the second carpet cushion embodiment of FIG. 5;

FIG. 8 is a bottom plan view of the second carpet cushion embodiment of FIG. 5;

FIG. 9 is a top plan view of a third embodiment of the carpet cushion according to the invention;

FIG. 10 is a side elevational view of the third carpet cushion embodiment of FIG. 9;

FIG. 11 is a front elevational view of the third carpet cushion embodiment of

FIG. 9;

FIG. 12 is a bottom plan view of the third carpet cushion embodiment of FIG. 9;

FIG. 13 js a top plan view of a fourth embodiment of a carpet cushion according to the invention;

FIG. 14 is a side elevational view of the fourth carpet cushion embodiment of FIG. 13;

FIG. 15 is a front elevational view of the fourth carpet cushion embodiment of FIG. 13;

FIG. 16 is a bottom plan view of the fourth carpet cushion embodiment of FIG. 13; and

FIG. 17 is a cross-sectional view in side elevation showing the carpet cushion of FIGS. 1-4 installed under a layer of carpet.

Description of the Preferred Embodiments

Referring first to FIGS. 1-4, there is shown a first embodiment 10 of the carpet underlayment according to the invention. The carpet underlayment is formed from a base layer 12 of compressible material, such as polyether polyurethane foam. The upper surface 13 of the base layer 12 is formed with a plurality of oval projections 14 that are separated from one another by liquid receiving channels 16. The oval projections 14 are aligned in substantially parallel rows along the length of the underlayment and a channel 16 is formed between each row. The rows of oval projections 14 are staggered, such that a second row of projections is offset from an adjacent first row. The projections thus form a repeating pattern or grid, with the projections of the first, third, fifth, etc. rows aligned with one another and the

projections of the second, fourth, sixth, etc. rows aligned with one another. The oval projections **14** have a front tip **18** and a rear tip **20**. A liquid receiving channel **22** is formed also between the rear tip **20** and the front tip **18** of two oval projections found in a respective row of projections **14**.

The projections **14** and channels **16, 22** preferably are formed in the upper surface **13** of the base layer **12** using the cutting method shown in U.S. Patents 5,534,208 and 5,688,538 (Barr, et al.), the disclosures of which are incorporated herein by reference. The projections **14** and channels **16, 22** may also be formed by other cutting methods or molding methods known to those of skill in the art. Cutting the foam surface to form the projections and channels is highly preferred. Known embossing methods have not been found satisfactory because the embossed

surface does not result in uniform channels of required depth to contain the liquids close to the point of liquid impact.

A liquid impervious film **24** is next applied to the upper surface **13** of the base layer **12** over the oval projections **14** and the channels **16, 22**. By "liquid impervious" I mean that the layer is substantially liquid impervious. Some trace amount of liquid may penetrate through the film after it is adhered to the base layer, but I intend to select a film that prevents substantial liquid from penetrating through the film and into the base layer.

The liquid impervious film **24** may be a casted or blown film having a thickness between about 0.002 to 0.004 inches. The film must have sufficient elongation and tensile strength to wrap and stretch around the oval projections **14** and channels **16, 22** on the upper surface **13** of the base layer **12**. I have found that polyethylene films, such as Dow Chemical INTEGRAL 933 adhesive film, work well. Other possible adhesive films are polyvinyl acetate (PVA) films, polyvinyl chloride (PVC) films, and polypropylene, polyester, polyamide, polybutadiene, polycarbonate and copolymers thereof. The films should have an ultimate tensile strength above about 2000 psi (using a 0.002 inch film) and preferably above 2200 psi, and most preferably above 2700 psi.

Preferably, the liquid impervious film **24** is applied with a hot roll laminator, such as a Black Brothers Hot Oil Laminator known to those of skill in the art. The liquid impervious film may also be attached to the upper surface of the base layer with an adhesive. Once the film has been adhered to the base layer, the carpet underlayment structure should have a low air flow through the product, which indicates more complete bonding between the liquid impervious film and the base

layer. Pressurized air is directed to the bottom surface **26** of the carpet underlayment **10** and forced through the underlayment. The air pressure is measured above the upper surface **13** and above the attached film **24**. The film **24** is bonded acceptably if the air flow measured is 10 ft^3/min or less. Preferably, the air flow is less than 4 ft^3/min.

Referring next to FIGS. 5-8, there is shown an alternate embodiment **30** of the carpet underlayment according to the invention. Similar to the first embodiment **10** of FIGS. 1-4, the carpet underlayment has a foam base layer **32** with a lower or bottom surface **34** and an upper surface **36**. Rectangular projections **38**, each with a front tip **40** and a rear tip **42** along its length, are aligned in substantially parallel rows. The front tip **40** of one projection **38** is positioned adjacent the rear tip **42** of the closest projection **38**, and this positioning continues to thus form a generally straight row. The front tips **40** and rear tips **42** of the projections **38** are separated from one another by channels **44** and the rows of rectangular projections **38** are separated from one another by channels **46**. Adjacent rows are positioned in staggered relation, such that the projections **38** form a repeating pattern or grid, with the projections of the first, third, fifth, etc. rows aligned with one another, and the projections of the second, fourth, sixth, etc. rows aligned with one another.

The second embodiment **30** is constructed of the same or similar materials as the first embodiment **10**. The channels **44, 46** have a depth of less than 1/2 inch, preferably from 1/16 to 1/4 inch, measured from the generally planar top surface of the projections **38**. The shape of the projections **38** differs from the projections **14** shown in FIG. 1 both in view of the rectangular top surface and the width of the planar top surface. I prefer using projections that have a length longer than their

width. The rectangular projections 38 might alternately be formed with a greater width than shown in FIG. 5. A liquid-impervious adhesive film 48 is adhered to the upper surface 36 of the base layer 32 and covers the rectangular projections 38 and the channels 44, 46 between the projections 38.

A third embodiment 50 is shown in FIGS. 9-12. This carpet underlayment is constructed similarly to the first and second embodiments, except that diamond-shaped projections 52 are formed in the upper surface 54 of the base layer 56. The diamond-shaped projections 52 each have a front tip 58 and a rear tip 60. The projections 52 are aligned in substantially straight parallel rows with the front tip 58 of an adjacent projection 52 positioned closely to the rear tip 60 of the closest projection in the row. The diamond-shaped projections 52 form regular repeating pattern, with the projections from the first, third, fifth, etc. row aligned and the projections of the second, fourth, sixth, etc. row aligned. Channels 62 are formed between the front tip 58 and rear tip 60 of adjacent diamond-shaped projections 52 in a row. Channels 66 are formed between the flat edges 64 of diamond-shaped projections 52 in adjacent rows. The channels 66 form a continuous generally zig-zag path between the projections 52 of adjacent rows. A liquid impervious film 68 adheres substantially uniformly to the upper surface 54 of the base layer 56.

A fourth embodiment 70 of the carpet underlayment according to the invention is shown in FIGS. 13-16. On the upper surface 72 of the base layer 74 is formed a series of peanut-shaped projections 76 aligned in substantially straight and substantially parallel rows. The front tip 78 of one peanut-shaped projection 76 is positioned adjacent the rear tip 80 of another peanut-shaped projection 76 to form the row. Channels 82 are formed between the front tip 78 and rear tip 80 of adjacent

peanut-shaped projections **76**. The peanut-shaped projections **76** are aligned in staggered rows forming a repeating pattern wherein the projections **76** of adjacent rows are offset from one another. The projections of the first, third, fifth, etc. rows are in similar alignment and the projections of the second, fourth, sixth, etc. rows are in similar alignment, but staggered from the position of the projections of the first, third, fifth, etc. rows. Serpentine channels **84** are formed between the peanut-shaped projections **76** of adjacent rows. A liquid impervious film **86** substantially uniformly adheres to and covers the peanut-shaped projections **76** and the channels **82, 84**.

FIG. 17 shows the carpet underlayment **10** of FIGS. 1-4 installed under a carpet construction **90**. The carpet construction **90** shown has upstanding carpet fibers **92** projecting from a woven carpet base **94**, although the carpet underlayment according to the invention may be used with any other conventional carpet construction. The lower surface of the woven carpet base **94** is placed in contact with the upper surface of the carpet underlayment. Thus, the carpet base **94** contacts the generally planar upper surfaces **13** of the oval projections **14** that are coated with liquid impervious film **24**.

Liquid **96** is shown held within the liquid receiving channels **22** between the tips **18, 20** of the oval projections **14**. Although not shown in FIG. 17, at the same time, liquid will also be held within nearby liquid receiving channels **16** between the rows of oval projections **14**. The liquid **96** spilled onto the carpet fibers **92** and penetrated through the carpet base **94** to the upper surface of the carpet underlayment. The channels **22, 16** between the oval projections **14** retain the spilled liquid in a defined cross-sectional area close to the point at which the liquid spill occurred. With the structure of liquid receiving channels and projections of the underlayment

according to the invention, the liquid does not migrate substantially away from the region at which the liquid spill occurred. The oval projections 14 keep the lower surface of the carpet base 94 away from the liquid 96 held within the channels 22.

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EXAMPLES

Foam: A prime flexible polyether polyurethane foam was formed from the following ingredients (Isocyanate Index 110):

	Parts by weight
polyether polyol:	50
graft polyol:	50
isocyanate (TDI):	28.4
amine catalyst:	0.15
C124 amine:	0.25
silicone surfactant:	1.0
tin catalyst:	0.2
color (blue pigment):	0.26

Using a continuous pouring process known in the art, the foam ingredients were mixed together and poured onto a moving conveyor. The foam was allowed to rise at room temperature and pressure and the foam bun was cured for 24 hours. The resulting foam had a density of 3 lbs/ft^3.

Carpet Underlayment: The foam was slit into a sheet with a thickness of 7/16 inches. The top surface of the sheet was cut to form a regular pattern of oval projections separated by troughs as shown in Figure 1. The projections were about 7/8 in. long and 5/16 in. wide, with a height of 1/8 in. The troughs between the projections were 1/8 in. wide.

A 0.00035 in. film of Dow Chemical INTEGRAL 933 adhesive film was applied to the cut top surface of the sheet using a Black Brothers Hot Oil laminator.

Spill Containment Test: The carpet underlayment made according to the invention was compared with the embossed carpet underlayment such as shown in Figure 4 in U.S. 5,762,735. The prior art embossed carpet underlayment had a thickness of 7/16 in. and had 0.002 in. of polyethylene film attached to its upper surface. The underlayment surface was imprinted or embossed with a chain imprint pattern.

In the experiment, 10 ounces of colored water were applied to the top surface of each underlayment. A clear, smooth Plexiglas plate marked with a length scale was placed over the water and the top surface of each underlayment. A 50 lb. weight was applied to the center of the Plexiglas plate. The longest dimension of the area covered by the colored water was measured. Thus, a lower number indicates better liquid containment close to the impact zone.

Sample # A (Comparison)	7.66 in.
Sample # 1 (Invention)	3.25 in.

Roll Shear Fatigue Test: Samples of underlayment #A and underlayment #1 were passed through compression nip rolls separated to form a gap of 0.010 inch. After the samples had been compressed through the nip rolls for 12,000 cycles each, they were removed and inspected. The foam core of underlayment #A (comparison) had degraded and separated from the polyethylene film. Underlayment #1 (invention) remained in tact and did not show foam degradation.

The invention has been illustrated by detailed description and examples of the preferred embodiments. Various changes in form and detail will be within the skill of persons skilled in the art. Therefore, the invention must be measured by the claims

and not by the description of the examples or the preferred embodiments.

I claim:

1. A carpet underlayment, comprising:

a base layer having an upper surface with a plurality of upstanding projections with generally planar top surfaces separated from one another by liquid receiving channels, wherein said channels have a depth of no more than about 0.25 inches as measured from the top surfaces of the projections; and

a liquid impervious film with an upper surface and a lower surface, wherein the lower surface of the film is attached to the upper surface of the base layer such that the film contours to the upstanding projections and the liquid receiving channels defined of the base layer.

2. The carpet underlayment of claim 1, wherein the base layer is formed from a compressible material selected from the group consisting of polyether polyurethane foam, polyester polyurethane foam, rebonded polyurethane foam, and mixtures of such foams.

3. The carpet underlayment of claim 1, wherein the channels have a depth in the range of between 0.6125 and 0.125 inches as measured from the top surfaces of the projections.

4. The carpet underlayment of claim 1, wherein the base layer has a density in the range of 2 to 6 lbs/ft^3.

5. The carpet underlayment of claim 1, wherein the liquid impervious film is made from a material selected from the group consisting of polyethylene, polyvinyl acetate, polyvinyl chloride, polypropylene, polyester, polyamide, polybutadiene, polycarbonate and copolymers thereof.

6. The carpet underlayment of claim 5, wherein the liquid impervious film has an ultimate tensile strength, measured for films of 0.002 inch thickness, of at least 2000 psi, and is attached to the upper surface of the base layer by hot roll lamination.

7. The carpet underlayment of claim 1, wherein the liquid impervious film has a thickness of between 0.002 and 0.004 inches.

8. The carpet underlayment of claim 1, wherein the liquid impervious film bonds sufficiently to the upper surface of the base layer such that no more than 10 ft^3/min forced air will flow through the carpet underlayment.

9. The carpet underlayment of claim 1, wherein the liquid impervious film bonds sufficiently to the upper surface of the base layer such that no more than 4 ft^3/min forced air will flow through the carpet underlayment.

10. The carpet underlayment of claim 1, wherein the top surfaces of the

projections form substantially identical regular geometric shapes, wherein each shape is separated from an adjacent shape by no more than about 0.25 in.

11. The carpet underlayment of claim 10, wherein the top surfaces of the projections form rectangles.

12. The carpet underlayment of claim 10, wherein the top surfaces of the projections form ovals.

13. The carpet underlayment of claim 10, wherein the top surfaces of the projections form diamonds.

14. The carpet underlayment of claim 10, wherein the top surfaces of the projections form peanut shapes.

15. The carpet underlayment of claim 10, wherein the projections are aligned in substantially straight and parallel rows.

16. The carpet underlayment of claim 10, where the projections are aligned in substantially straight and parallel rows and projections from adjacent rows are positioned staggered from one another such that the projections on the upper surface of the base layer form an alternating pattern.

17. The carpet underlayment of claim 1, wherein when 10 ounces of a

liquid are spilled onto the underlayment in an impact zone, the liquid is contained within an area no more than about 6 inches from the impact zone.

18. The carpet underlayment of claim 1 in combination with a layer of carpet.